DETAILED DESCRIPTION OF THE INVENTION

As it is already known, a differential gear need allow/provide variable rotation means to each output shaft, relative to the input shaft.

The ideal differential will have an all gear system, and a continuous rotation means to each output shaft, and yet allows/provides variable rotation to each output shaft.

The said new differential is such a differential. It also has other advantages. It has a dual driving means to each output shaft, and an anti-rollback means to at least to at least one of the output shafts/drive wheels.

It is because of a new planetary gear that the above mentioned advantages are possible. The said new planetary gear can be used as a differential gear, but it would take at least two of the said new planetary gears, to achieve all of the first said advantages. The new planetary gear is a simple, but essential mechanism for the overall said operation, of the said new differential.

It is also known that inversely proportional rotation between output shafts relative to the input drive source, would be more disirable, than variability that is dependant upon one drive wheel, or the other, being variable relative to the rotation of the drive source.

The uniqueness of the said new planetary gear is that one of it's output shafts (10), would be caused to rotate in a reverse direction, relative to the direction of the drive source means (7); dependant on the immobility of the opposing output shaft/drive means (6). This "reverse" effect is utilized to cause a gear-locking effect. Thus preventing the immobilization of

at least one of the output shafts/drive wheels.

The said new planetary gear has two sun gears (6, 7), being immediately adjacent to each other, and both having the same axis. It also has a planet gear (15, 16). The said new planetary gear also has a support structure/case 9, having the same axis as the sun gears (6, 7). The said planet gear (5) (15, 16) is/are rotatively stationary to the said support structure (9), and orbitally engaged to/across both sun gears (6, 7). An output shaft (5) is affixed to one sun gear (6), and an input shaft (19) is affixed to the other sun gear (7). The second output shaft (10), is affixed to the said support structure (9). The input shaft, and the output shafts, have the same axis.

To simplify and reduce the number of elements (parts), the new said differential is integrated with a conventional planetary gear.

The said new differential shown in the drawing, is herein described, and being rotated in the direction indicated in the drawing.

The bevel gears 13 and 14, being also called planet gears.

The housing 25, (shown fragmented) is the outermost support element of the said new differential. The end plate 20, is affixed to case 8, by bolts 28 and 30. The differential case 8, being rotatively supported, and axially supported in the said housing 25, by way of the outwardly protruding axial stock of case 8, and it's affixed end plate 20. The crown gear 24, is affixed to case 8, by bolts 29 and 31. The said new differential herein being rotated by way of the crown gear 24, shaft 23 and gear 22. Gear 22, being splined to the shaft 23, and being (n of

rotatively supported by the housing 25. The case 9, being axially and rotatively supported in the case 8, by way of the protruding end support stock of case 9, and bearing 26. The case 9, also being supported, by way of bevel gear 11. The said bevel gear 11, being axially affixed/splined to the case 9. The bevel gear 11, being axially supported and rotatively supported by way of the bearing 21, and the shaft 19. The shaft 19, by way of it's end support stock 2, is axially supported and stationary to the case 8, by way of the support member 1. The support member 1 (shown with an circular invisible line) is affixed/stationary to the case 8. Pinion shafts 3 and 4, are stationary to case 8, by way of case 8, and the said support stock 2; of shaft 19. The axle shaft 5, being entered, and supported rotatively through/by the central stock of case 8, support 1, and shaft 19. The final resting place of axle shaft 5, being the central inside wall of case 9. the bevel gear 12, is splined/stationary to the axle shaft 5. The bevel gear 12, being axially, and rotatively supported in the case 8, by way of the bearing 27, and the extended support stock of the said bevel gear 12. The bevel gears 13 and 14, being rotatively stationary to the case 8, by pinion shafts 3 and 4. The bevel gears 13 and 14, being in continuous engagement contact with the bevel gears 11 and 12. The axle shaft 10, being axially splined/stationary to the extended support stock of the case 9. The gear 6, is axially splined/stationary to the end of axle shaft 5. The gear 7, is axially splined to the end of shaft 19. The shafts 17 and 18, are stationary to the case 9, and parallel to the axis of the said case 9. The gears 15 and 16, have the same function/purpose. The gear 15 is axially,

and rotatively stationary in the case 9, by way of shaft 17. The gear 16, is axially, and rotatively stationary in the case 9, by way of the shaft 18. The gears 15 and 16, are orbitally engaged to the gears 6 and 7.

Wherein the said new differential, is being rotated in the direction indicated in the drawing; and

(a) wherein each axle section/drive wheel of the vehicle, has equal resistance to being rotated.

The bevel gears 13 and 14, will drive bevel gears 11 and 12 equally. Herein driving/rotating axle shaft 5, by way of the bevel gear 12. Herein also driving/rotating axle shaft 10, by way of the bevel gear 11, and the case 9.

(b) wherein the axle sections/drive wheels, are needed to rotate at different speeds.

The drive wheel of axle 5, by way of the gear 6, if/when externally rotated, whether faster or slower than the case 8 and the gear 7. The gear 6 will force the gears 15 and 16, to counter rotate over/around gear 7. Thus causing the axle section/drive wheel of the case 9, to rotate inversely proportional to the said axle 5, and it's drive wheel. The bevel gears 11 and 12 also allowing/accommodating the said inversely proportional axle section rotation variability of the opposing axle sections.

(c) wherein the drive wheels/axle section of axle 10, is resisting any/all rotation by the said new differential.

Whenever the axle shaft 10, is immobilized, herein the case 9 also becomes immobilized. Therefore the planet gears 15 and 16, become radially immobilized.

Herein the said planet gears 15 and 16, can not orbit/revolve around the sun gears 6 and 7. Herein the said planet gears 15 and 16 can only rotate in place. Therefore the sun gears 6 and 7 can only rotate at the same speed, which is the speed of the differential case 8; because of the sun gear 7. Herein causing bevel gear 12, by way of the axle shaft 5 and the sun gear 6, to also rotate at the same speed as the differential case 8. Herein causing a gear locking effect, by way of the bevel gears 12, 13, and 14. Thus bevel gear 11 is forced to rotate at the same speed as the bevel gear 12, which is the same speed as the (drive) case 8. Thereby forcing axle shaft 10, and it's drive wheel to rotate, by way of case 9, and bevel gear 11.

(d) Wherein the drive wheels/axle section of axle 5, is resisting any/all rotation by the said new differential.

Herein the bevel gears 13 and 14, rotating against the immobile bevel gear 12; of the said immobilized axle shaft 5, herein will try to effect rotation of case 9, in the same direction of rotation as that of the (drive) case 8. Herein the sun gear 7; being stationary to the case 8, will by way of the gears 15, 16, and 6, try to effect a rotation of case 9, in a reverse direction as that of the (drive) case 8. Whereas the said case 9, can not be rotated in two different axial directions at the same time, herein a gear-locking effect is caused in both axle sections. Herein both axle shafts 5 and 10/drive wheels, are forced to rotate together, and at the same speed as the (drive) case 8.

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